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IN THE MATTER OF THE REVISION OF RATES

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Appendices A through I
to Accompany the
Direct Testimony

of

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Concerning
Cost of Equity

Table of Contents

Appendix A - Educational Background, Business Experience and Qualifications

Appendix B - Ratesetting Principles

Appendix C - Evaluation of Risk

Appendix D - Cost of Equity - General Approach

Appendix E - Discounted Cash Flow Analysis

Appendix F - Interest Rates

Appendix G - Risk Premium Analysis

Appendix H - Capital Asset Pricing Model

Appendix I - Comparable Earnings Approach

1 **EDUCATIONAL BACKGROUND, BUSINESS EXPERIENCE**
2 **AND QUALIFICATIONS**
3 _____

4 I was awarded a degree of Bachelor of Science in Business Administration by Drexel
5 University in 1971. While at Drexel, I participated in the Cooperative Education Program which
6 included employment, for one year, with American Water Works Service Company, Inc., as an
7 internal auditor, where I was involved in the audits of several operating water companies of the
8 American Water Works System and participated in the preparation of annual reports to regulatory
9 agencies and assisted in other general accounting matters.

10 Upon graduation from Drexel University, I was employed by American Water Works
11 Service Company, Inc., in the Eastern Regional Treasury Department where my duties included
12 preparation of rate case exhibits for submission to regulatory agencies, as well as responsibility for
13 various treasury functions of the thirteen New England operating subsidiaries.

14 In 1973, I joined the Municipal Financial Services Department of Betz Environmental
15 Engineers, a consulting engineering firm, where I specialized in financial studies for municipal
16 water and wastewater systems.

17 In 1974, I joined Associated Utility Services, Inc., now known as AUS Consultants. I held
18 various positions with the Utility Services Group of AUS Consultants, concluding my employment
19 there as a Senior Vice President.

20 In 1994, I formed P. Moul & Associates, an independent financial and regulatory consulting
21 firm. In my capacity as Managing Consultant and for the past twenty-eight years, I have
22 continuously studied the rate of return requirements for cost of service regulated firms. In this

1 regard, I have supervised the preparation of rate of return studies which were employed in
2 connection with my testimony and in the past for other individuals. I have presented direct
3 testimony on the subject of fair rate of return, evaluated rate of return testimony of other witnesses,
4 and presented rebuttal testimony.

5 My studies and prepared direct testimony have been presented before twenty-eight (28)
6 federal, state and municipal regulatory commissions, consisting of: the Federal Energy Regulatory
7 Commission; state public utility commissions in Alabama, Connecticut, Delaware, Florida,
8 Georgia, Hawaii, Illinois, Indiana, Iowa, Kentucky, Maine, Maryland, Massachusetts, Michigan,
9 Minnesota, Missouri, New Hampshire, New Jersey, New York, North Carolina, Ohio, Tennessee,
10 Pennsylvania, South Carolina, Virginia, and West Virginia; and the Philadelphia Gas Commission.

11 My testimony has been offered in over 200 rate cases involving electric power, natural gas
12 distribution and transmission, resource recovery, solid waste collection and disposal, telephone,
13 wastewater, and water service utility companies. While my testimony has involved principally fair
14 rate of return and financial matters, I have also testified on capital allocations, capital recovery,
15 cash working capital, income taxes, factoring of accounts receivable, and take-or-pay expense
16 recovery. My testimony has been offered on behalf of municipal and investor-owned public
17 utilities and for the staff of a regulatory commission. I have also testified at an Executive Session
18 of the State of New Jersey Commission of Investigation concerning the BPU regulation of solid
19 waste collection and disposal.

20 I was a co-author of a verified statement submitted to the Interstate Commerce Commission
21 concerning the 1983 Railroad Cost of Capital (Ex Parte No. 452). I was also co-author of

1 comments submitted to the Federal Energy Regulatory Commission regarding the Generic
2 Determination of Rate of Return on Common Equity for Public Utilities in 1985, 1986 and 1987
3 (Docket Nos. RM85-19-000, RM86-12-000, RM87-35-000 and RM88-25-000). Further, I have
4 been the consultant to the New York Chapter of the National Association of Water Companies
5 which represented the water utility group in the Proceeding on Motion of the Commission to
6 Consider Financial Regulatory Policies for New York Utilities (Case 91-M-0509). I have also
7 submitted comments to the Federal Energy Regulatory Commission in its Notice of Proposed
8 Rulemaking (Docket No. RM99-2-000) concerning Regional Transmission Organizations and on
9 behalf of the Edison Electric Institute in its intervention in the case of Southern California Edison
10 Company (Docket No. ER97-2355-000).

11 In late 1978, I arranged for the private placement of bonds on behalf of an investor-owned
12 public utility. I have assisted in the preparation of a report to the Delaware Public Service
13 Commission relative to the operations of the Lincoln and Ellendale Electric Company. I was also
14 engaged by the Delaware P.S.C. to review and report on the proposed financing and disposition of
15 certain assets of Sussex Shores Water Company (P.S.C. Docket Nos. 24-79 and 47-79). I was a
16 co-author of a Report on Proposed Mandatory Solid Waste Collection Ordinance prepared for the
17 Board of County Commissioners of Collier County, Florida.

18 I have been a consultant to the Bucks County Water and Sewer Authority concerning rates
19 and charges for wholesale contract service with the City of Philadelphia. My municipal consulting
20 experience also included an assignment for Baltimore County, Maryland, regarding the City/County
21 Water Agreement for Metropolitan District customers (Circuit Court for Baltimore County in Case

1 34/153/87-CSP-2636).

2 I am a member of the Society of Utility and Regulatory Financial Analysis (formerly the
3 National Society of Rate of Return Analysts) and have attended several Financial Forums
4 sponsored by the Society. I attended the first National Regulatory Conference at the Marshall-
5 Wythe School of Law, College of William and Mary. I also attended an Executive Seminar
6 sponsored by the Colgate Darden Graduate Business School of the University of Virginia
7 concerning Regulated Utility Cost of Equity and the Capital Asset Pricing Model. In October 1984,
8 I attended a Standard & Poor's Seminar on the Approach to Municipal Utility Ratings, and in May
9 1985, I attended an S&P Seminar on Telecommunications Ratings.

10 My lecture and speaking engagements include:

11	<u>Date</u>	<u>Occasion</u>	<u>Sponsor</u>
12			
13	April 2001	Thirty-third Financial Forum	Society of Utility & Regulatory
14			Financial Analysts
15	December 2000	Pennsylvania Public Utility	Pennsylvania Bar Institute
16		Law Conference:	
17		Non-traditional Players	
18		in the Water Industry	
19	July 2000	EEI Member Workshop	Edison Electric Institute
20		Developing Incentives Rates:	
21		Application and Problems	
22	February 2000	The Sixth Annual	Exnet and Bruder, Gentile &
23		FERC Briefing	Marcoux, LLP
24	March 1994	Seventh Annual	Electric Utility
25		Proceeding	Business Environment Conference
26	May 1993	Financial School	New England Gas Assoc.
27	April 1993	Twenty-Fifth	National Society of Rate
28		Financial Forum	of Return Analysts
29	June 1992	Rate and Charges	American Water Works
30		Subcommittee	Association
31		Annual Conference	
32	May 1992	Rates School	New England Gas Assoc.

1	October 1989	Seventeenth Annual	Water Committee of the
2		Eastern Utility	National Association
3		Rate Seminar	of Regulatory Utility
4			Commissioners Florida
5			Public Service Commission
6			and University of Utah
7	October 1988	Sixteenth Annual	Water Committee of the
8		Eastern Utility	National Association
9		Rate Seminar	of Regulatory Utility
10			Commissioners, Florida
11			Public Service
12			Commission and University
13			of Utah
14	May 1988	Twentieth Financial	National Society of
15		Forum	Rate of Return Analysts
16	October 1987	Fifteenth Annual	Water Committee of the
17		Eastern Utility	National Association
18		Rate Seminar	of Regulatory Utility
19			Commissioners, Florida
20			Public Service Commis-
21			sion and University of
22			Utah
23	September 1987	Rate Committee	American Gas Association
24		Meeting	
25	May 1987	Pennsylvania	National Association of
26		Chapter	Water Companies
27		annual meeting	
28	October 1986	Eighteenth	National Society of Rate
29		Financial	of Return
30		Forum	
31	October 1984	Fifth National	American Bar Association
32		on Utility	
33		Ratemaking	
34		Fundamentals	
35	March 1984	Management Seminar	New York State Telephone
36			Association
37	February 1983	The Cost of Capital	Temple University, School
38		Seminar	of Business Admin.

1	May 1982	A Seminar on	New Mexico State
2		Regulation	University, Center for
3		and The Cost of	Business Research
4		Capital	and Services
5	October 1979	Economics of	Brown University
6		Regulation	

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1 thereby enabling it to attract, on a reasonable cost basis, the funds necessary to satisfy its capital
2 requirements so that it can meet the obligation to provide adequate and reliable service to the
3 public.

4 A fair rate of return must not only provide the utility with the ability to attract new capital,
5 it must also be fair to existing investors. An appropriate rate of return which may have been
6 reasonable at one point in time may become too high or too low at a subsequent point in time,
7 based upon changing business risks, economic conditions and alternative investment opportunities.

8 When applying the standards of a fair rate of return, it must be recognized that the end result must
9 provide for the payment of interest on the company's debt, the payment of dividends on the
10 company's stock, the recovery of costs associated with securing capital, the maintenance of
11 reasonable credit quality for the company, and support of the company's financial condition, which
12 today would include those measures of financial performance in the areas of interest coverage and
13 adequate cash flow derived from a reasonable level of earnings.

EVALUATION OF RISK

The rate of return required by investors is directly linked to the perceived level of risk. The greater the risk of an investment, the higher is the required rate of return necessary to compensate for that risk all else being equal. Because investors will seek the highest rate of return available, considering the risk involved, the rate of return must at least equal the investor-required, market-determined cost of capital if public utilities are to attract the necessary investment capital on reasonable terms.

In the measurement of the cost of capital, it is necessary to assess the risk of a firm. The level of risk for a firm is often defined as the uncertainty of achieving expected performance, and is sometimes viewed as a probability distribution of possible outcomes. Hence, if the uncertainty of achieving an expected outcome is high, the risk is also high. As a consequence, high risk firms must offer investors higher returns than low risk firms which pay less to attract capital from investors. This is because the level of uncertainty, or risk of not realizing expected returns, establishes the compensation required by investors in the capital markets. Of course, the risk of a firm must also be considered in the context of its ability to actually experience adequate earnings which conform with a fair rate of return. Thus, if there is a high probability that a firm will not perform well due to fundamentally poor market conditions, investors will demand a higher return.

The investment risk of a firm is comprised of its business risk and financial risk. Business risk is all risk other than financial risk, and is sometimes defined as the staying power of the market demand for a firm's product or service and the resulting inherent uncertainty of realizing expected pre-tax returns on the firm's assets. Business risk encompasses all operating factors, e.g., productivity, competition, management ability, etc. that bear upon the expected pre-tax operating

1 income attributed to the fundamental nature of a firm's business. Financial risk results from a
2 firm's use of borrowed funds (or similar sources of capital with fixed payments) in its capital
3 structure, i.e., financial leverage. Thus, if a firm did not employ financial leverage by borrowing
4 any capital, its investment risk would be represented by its business risk.

5 It is important to note that in evaluating the risk of regulated companies, financial leverage
6 cannot be considered in the same context as it is for non-regulated companies. Financial leverage
7 has a different meaning for regulated firms than for non-regulated companies. For regulated public
8 utilities, the cost of service formula gives the benefits of financial leverage to consumers in the
9 form of lower revenue requirements. For non-regulated companies, all benefits of financial
10 leverage are retained by the common stockholder. Although retaining none of the benefits,
11 regulated firms bear the risk of financial leverage. Therefore, a regulated firm's rate of return on
12 common equity must recognize the greater financial risk shown by the higher leverage typically
13 employed by public utilities.

14 Although no single index or group of indices can precisely quantify the relative investment
15 risk of a firm, financial analysts use a variety of indicators to assess that risk. For example, the
16 creditworthiness of a firm is revealed by its bond ratings. If the stock is traded, the price-earnings
17 multiple, dividend yield, and beta coefficients (a statistical measure of a stock's relative volatility
18 to the rest of the market) provide some gauge of overall risk. Other indicators, which are reflective
19 of business risk, include the variability of the rate of return on equity, which is indicative of the
20 uncertainty of actually achieving the expected earnings; operating ratios (the percentage of
21 revenues consumed by operating expenses, depreciation, and taxes other than income tax), which
22 are indicative of profitability; the quality of earnings, which considers the degree to which earnings

1 are the product of accounting principles or cost deferrals; and the level of internally generated
2 funds. Similarly, the proportion of senior capital in a company's capitalization is the measure of
3 financial risk which is often analyzed in the context of the equity ratio (i.e., the complement of the
4 debt ratio).

1 **COST OF EQUITY--GENERAL APPROACH**

2 Through a fundamental financial analysis, the relative risk of a firm must be established
3 prior to the determination of its cost of equity. Any rate of return recommendation which lacks
4 such a basis will inevitably fail to provide a utility with a fair rate of return except by coincidence.

5 With a fundamental risk analysis as a foundation, standard financial models can be employed by
6 using informed judgment. The methods which have been employed to measure the cost of equity
7 include: the Discounted Cash Flow ("DCF") model, the Risk Premium ("RP") approach, the Capital
8 Asset Pricing Models ("CAPM") and the Comparable Earnings ("CE") approach.

9 The traditional DCF model, while useful in providing some insight into the cost of equity,
10 is not an approach that should be used exclusively. The divergence of stock prices from company-
11 specific fundamentals can provide a misleading cost of equity calculation. As reported in The Wall
12 Street Journal on June 6, 1991, a statistical study published by Goldman Sachs indicated that only
13 35% of stock price growth in the 1980's could be attributed to earnings and interest rates. Further,
14 38% of the rise in stock prices during the 1980's was attributed to unknown factors. The Goldman
15 Sachs study highlights the serious limitations of a model, such as DCF, which is founded upon
16 identification of specific variables to explain stock price growth. That is to say, when stock price
17 growth exceeds growth in a company's earnings per share, models such as DCF will misspecify
18 investor expected returns which are comprised of capital gains, as well as dividend receipts. As
19 such, a combination of methods should be used to measure the cost of equity.

20 The Risk Premium analysis is founded upon the prospective cost of long-term debt, i.e., the
21 yield that the public utility must offer to raise long-term debt capital directly from investors. To
22 that yield must be added a risk premium in recognition of the greater risk of common equity over

1 debt. This additional risk is, of course, attributable to the fact that the payment of interest and
2 principal to creditors has priority over the payment of dividends and return of capital to equity
3 investors. Hence, equity investors require a higher rate of return than the yield on long-term
4 corporate bonds.

5 The CAPM is a model not unlike the traditional Risk Premium. The CAPM employs the
6 yield on a risk-free interest-bearing obligation plus a premium as compensation for risk. Aside
7 from the reliance on the risk-free rate of return, the CAPM gives specific quantification to
8 systematic (or market) risk as measured by beta.

9 The Comparable Earnings approach measures the returns expected/experienced by other
10 non-regulated firms and has been used extensively in rate of return analysis for over a half century.

11 However, its popularity diminished in the 1970s and 1980s with the popularization of market-
12 based models. Recently, there has been renewed interest in this approach. Indeed, the financial
13 community has expressed the view that the regulatory process must consider the returns which are
14 being achieved in the non-regulated sector so that public utilities can compete effectively in the
15 capital markets. Indeed, with additional competition being introduced throughout the traditionally
16 regulated public utility industry, returns expected to be realized by non-regulated firms have
17 become increasing relevant in the ratesetting process. The Comparable Earnings approach
18 considers directly those requirements and it fits the established standards for a fair rate of return
19 set forth in the Bluefield and Hope decisions. The Hope decision requires that a fair return for a
20 utility must be equal to that earned by firms of comparable risk.

1 **DISCOUNTED CASH FLOW ANALYSIS**

2 Discounted Cash Flow ("DCF") theory seeks to explain the value of an economic or
3 financial asset as the present value of future expected cash flows discounted at the appropriate risk-
4 adjusted rate of return. Thus, if \$100 is to be received in a single payment 10 years subsequent to
5 the acquisition of an asset, and the appropriate risk-related interest rate is 8%, the present value of
6 the asset would be \$46.32 (Value = $\$100 \div (1.08)^{10}$) arising from the discounted future cash flow.
7 Conversely, knowing the present \$46.32 price of an asset (where price = value), the \$100 future
8 expected cash flow to be received 10 years hence shows an 8% annual rate of return implicit in the
9 price and future cash flows expected to be received.

10 In its simplest form, the DCF theory considers the number of years from which the cash
11 flow will be derived and the annual compound interest rate which reflects the risk or uncertainty
12 associated with the cash flows. It is appropriate to reiterate that the dollar values to be discounted
13 are future cash flows.

14 DCF theory is flexible and can be used to estimate value (or price) or the annual required
15 rate of return under a wide variety of conditions. The theory underlying the DCF methodology can
16 be easily illustrated by utilizing the investment horizon associated with a preferred stock not having
17 an annual sinking fund provision. In this case, the investment horizon is infinite, which reflects
18 the perpetuity of a preferred stock. If P represents price, K_p is the required rate of return on a
19 preferred stock, and D is the annual dividend (P and D with time subscripts), the value of a
20 preferred share is equal to the present value of the dividends to be received in the future discounted
21 at the appropriate risk-adjusted interest rate, K_p . In this circumstance:

$$P_0 = \frac{D_1}{(1 + K_p)} + \frac{D_2}{(1 + K_p)^2} + \frac{D_3}{(1 + K_p)^3} + \dots + \frac{D_n}{(1 + K_p)^n}$$

1 If $D_1 = D_2 = D_3 = \dots D_n$ as is the case for preferred stock, and n approaches infinity, as is the case
2 for non-callable preferred stock without a sinking fund, then this equation reduces to:

3

4
$$P_0 = \frac{D_1}{K_p}$$

5 This equation can be used to solve for the annual rate of return on a preferred stock when the
6 current price and subsequent annual dividends are known. For example, with $D_1 = \$1.00$, and P_0
7 $= \$10$, then $K_p = \$1.00 \div \10 , or 10%.

8 The dividend discount equation, first shown, is the generic DCF valuation model for all
9 equities, both preferred and common. While preferred stock generally pays a constant dividend,
10 permitting the simplification subsequently noted, common stock dividends are not constant.
11 Therefore, absent some other simplifying condition, it is necessary to rely upon the generic form
12 of the DCF. If, however, it is assumed that $D_1, D_2, D_3, \dots D_n$ are systematically related to one
13 another by a constant growth rate (g), so that $D_0(1 + g) = D_1, D_1(1 + g) = D_2, D_2(1 + g) = D_3$ and
14 so on approaching infinity, and if K_s (the required rate of return on a common stock) is greater than
15 g , then the DCF equation can be reduced to:

$$P_0 = \frac{D_1}{K_s - g} \text{ or } P_0 = \frac{D_0(1 + g)}{K_s - g}$$

1 which is the periodic form of the "Gordon" model.¹ Proof of the DCF equation is found in all
2 modern basic finance textbooks. This DCF equation can be easily solved as:

$$K_s = \frac{D_0(1+g)}{P_0} + g$$

3
4 which is the periodic form of the Gordon Model commonly applied in estimating equity rates of
5 return in rate cases. When used for this purpose, K_s is the annual rate of return on common equity
6 demanded by investors to induce them to hold a firm's common stock. Therefore, the variables D_0 ,
7 P_0 and g must be estimated in the context of the market for equities, so that the rate of return, which
8 a public utility is permitted the opportunity to earn, has meaning and reflects the investor-required
9 cost rate.

10 Application of the Gordon model with market derived variables is straightforward. For
11 example, using the most recent prior annualized dividend (D_0) of \$0.80, the current price (P_0) of
12 \$10.00, and the investor expected dividend growth rate (g) of 5%, the solution of the DCF formula
13 provides a 13.4% rate of return. The dividend yield component in this instance is 8.4%, and the
14 capital gain component is 5%, which together represent the total 13.4% annual rate of return
15 required by investors. The capital gain component of the total return may be calculated with two
16 adjacent future year prices. For example, in the eleventh year of the holding period, the price per
17 share would be \$17.10 as compared with the price per share of \$16.29 in the tenth year which

¹ Although the popular application of the DCF model is often attributed to the work of Myron J. Gordon in

1 demonstrates the 5% annual capital gain yield.

2 Some DCF devotees believe that it is more appropriate to estimate the required return on
3 equity with a model which permits the use of multiple growth rates. This may be a plausible
4 approach to DCF, where investors expect different dividend growth rates in the near term and long
5 run. If two growth rates, one near term and one long-run, are to be used in the context of a price
6 (P_0) of \$10.00, a dividend (D_0) of \$0.80, a near-term growth rate of 5.5%, and a long-run expected
7 growth rate of 5.0% beginning at year 6, the required rate of return is 13.57% solved with a
8 computer by iteration.

9 **Use of DCF in Ratesetting**

10 The DCF method can provide a misleading measure of the cost of equity in the ratesetting
11 process when stock prices diverge from book values by a meaningful margin. When the difference
12 between share values and book values is significant, the results from the DCF can result in a
13 misspecified cost of equity when those results are applied to book value. This is because investor
14 expected returns, as described by the DCF model, are related to the market value of common stock.
15 This discrepancy is shown by the following example. If it is assumed, hypothetically, that investors
16 require a 12.5% return on their common stock investment value (i.e., the market price per share)
17 when share values represent 150% of book value, investors would require a total annual return of
18 \$1.50 per share on a \$12.00 market value to realize their expectations. If, however, this 12.5%
19 market-determined cost rate is applied to an original cost rate base which is equivalent to the book
20 value of common stock of \$8.00 per share, the utility's actual earnings per share would be only

the mid-1950's, J. B. Williams explicated the DCF model in its present form nearly two decades earlier.

1 \$1.00. This would result in a \$.50 per share earnings shortfall which would deny the utility the
2 ability to satisfy investor expectations.

3 As a consequence, a utility could not withstand these DCF results applied in a rate case and
4 also sustain its financial integrity. This is because \$1.00 of earnings per share and a 75% dividend
5 payout ratio would provide earnings retention growth of just 3.125% (i.e., $\$1.00 \times .75 = \0.75 , and
6 $\$1.00 - \$0.75 = \$0.25 \div \$8.00 = 3.125\%$). In this example, the earnings retention growth rate plus
7 the 6.25% dividend yield ($\$0.75 \div \12.00) would equal 9.375% ($6.25\% + 3.125\%$) as indicated by
8 the DCF model. This DCF result is the same as the utility's rate of dividend payments on its book
9 value (i.e., $\$0.75 \div \$8.00 = 9.375\%$). This situation provides the utility with no earnings cushion
10 for its dividend payment because the DCF result equals the dividend rate on book value (i.e., both
11 rates are 9.375% in the example). Moreover, if the price employed in my example were higher
12 than 150% of book value, a "negative" earnings cushion would develop and cause the need for a
13 dividend reduction because the DCF result would be less than the dividend rate on book value. For
14 these reasons, the usefulness of the DCF method significantly diminishes as market prices and book
15 values diverge.

16 Further, there is no reason to expect that investors would necessarily value utility stocks
17 equal to their book value. In fact, it is rare that utility stocks trade at book value. Moreover, high
18 market-to-book ratios may be reflective of general market sentiment. Were regulators to use the
19 results of a DCF model, that fails to produce the required return when applied to an original cost
20 rate base, they would penalize a company with high market-to-book ratios. This clearly would
21 penalize a regulated firm and its investors that purchased the stock at its current price. When

1 investor expectations are not fulfilled, the market price per share will decline and a new, different
2 equity cost rate would be indicated from the lower price per share. This condition suggests that the
3 current price would be subject to disequilibrium and would not allow a reasonable calculation of
4 the cost of equity. This situation would also create a serious disincentive for management initiative
5 and efficiency. Within that framework, a perverse set of goals and rewards would result, i.e., a high
6 authorized rate of return in a rate case would be the reward for poor financial performance, while
7 low rates of return would be the reward for good financial performance. As such, the DCF results
8 should not be used alone to determine the cost of equity, but should be used along with other
9 complementary methods.

10 **Dividend Yield**

11 The historical annual dividend yield for the Barometer Group is shown on Schedule 3. The
12 1997-2001 five-year average dividend yield was 4.7% for the Barometer Group. The monthly
13 dividend yields for the past twelve months are shown graphically on Schedule 5. These dividend
14 yields reflect an adjustment to the month-end closing prices to remove the pro rata accumulation
15 of the quarterly dividend amount since the last ex-dividend date.

16 The ex-dividend date usually occurs two business days before the record date of the
17 dividend (i.e., the date by which a shareholder must own the shares to be entitled to the dividend
18 payment--usually about two to three weeks prior to the actual payment). During a quarter (here
19 defined as 91 days), the price of a stock moves up ratably by the dividend amount as the ex-
20 dividend date approaches. The stock's price then falls by the amount of the dividend on the ex-
21 dividend date. Therefore, it is necessary to calculate the fraction of the quarterly dividend since

1 the time of the last ex-dividend date and to remove that amount from the price. This adjustment
2 reflects normal recurring pricing of stocks in the market, and establishes a price which will reflect
3 the true yield on a stock.

4 A six-month average dividend yield has been used to recognize the prospective orientation
5 of the ratesetting process as explained in the direct testimony. For the purpose of a DCF
6 calculation, the average dividend yields must be adjusted to reflect the prospective nature of the
7 dividend payments, i.e., the higher expected dividends for the future rather than the recent dividend
8 payment annualized. An adjustment to the dividend yield component, when computed with
9 annualized dividends, is required based upon investor expectation of quarterly dividend increases.

10 The procedure to adjust the average dividend yield for the expectation of a dividend
11 increase during the initial investment period will be at a rate of one-half the growth component,
12 developed below. The DCF equation, showing the quarterly dividend payments as D_0 , may be
13 stated in this fashion:

$$K = \frac{D_0(1+g)^0 + D_0(1+g)^0 + D_0(1+g)^1 + D_0(1+g)^1}{P_0} + g$$

14 The adjustment factor, based upon one-half the expected growth rate developed in my direct
15 testimony, will be 3.000% (6.00% x .5) for the Barometer Group, which assumes that two dividend
16 payments will be at the expected higher rate during the initial investment period. Using the six-
17 month average dividend yield as a base, the prospective (forward) dividend yield would be 5.26%
18 (5.11% x 1.03000) for the Barometer Group.

1 Another DCF model that reflects the discrete growth in the quarterly dividend (D_0) is as
2 follows:

$$K = \frac{D_0(1+g)^{25} + D_0(1+g)^{50} + D_0(1+g)^{75} + D_0(1+g)^{1.00}}{P_0} + g$$

3 This procedure confirms the reasonableness of the forward dividend yield previously calculated.
4 The quarterly discrete adjustment provides a dividend yield of 5.30% ($5.11\% \times 1.03723$) for the
5 Barometer Group. The use of an adjustment is required for the periodic form of the DCF in order
6 to properly recognize that dividends grow on a discrete basis.

7 In either of the preceding DCF dividend yield adjustments, there is no recognition for the
8 compound returns attributed to the quarterly dividend payments. Investors have the opportunity
9 to reinvest quarterly dividend receipts. Recognizing the compounding of the periodic quarterly
10 dividend payments (D_0), results in a third DCF formulation:

$$k = \left[\left(1 + \frac{D_0}{P_0} \right)^4 - 1 \right] + g$$

11 This DCF equation provides no further recognition of growth in the quarterly dividend. Combining
12 discrete quarterly dividend growth with quarterly compounding would provide the following DCF
13 formulation, stating the quarterly dividend payments (D_0):

$$k = \left[\left(1 + \frac{D_0 (1+g)^{25}}{P_0} \right)^4 - 1 \right] + g$$

1 A compounding of the quarterly dividend yield provides another procedure to recognize the
2 necessity for an adjusted dividend yield. The unadjusted average quarterly dividend yield was
3 1.2775% ($5.11\% \div 4$) for the Barometer Group. The compound dividend yield would be 5.29%
4 ($1.01296^4 - 1$) for the Barometer Group, recognizing quarterly dividend payments in a forward-
5 looking manner. These dividend yields conform with investors' expectations in the context of
6 reinvestment of their cash dividend.

7 For the Barometer Group, a 5.28% forward-looking dividend yield is the average (5.26%
8 $+ 5.30\% + 5.29\% = 15.85\% \div 3$) of the adjusted dividend yield using the form $D_0/P_0 (1+.5g)$, the
9 dividend yield recognizing discrete quarterly growth, and the quarterly compound dividend yield
10 with discrete quarterly growth.

11 Growth Rate

12
13 If viewed in its infinite form, the DCF model is represented by the discounted value of an
14 endless stream of growing dividends. It would, however, require 100 years of future dividend
15 payments so that the discounted value of those payments would equate to the present price so that
16 the discount rate and the rate of return shown by the simplified Gordon form of the DCF model
17 would be about the same. A century of dividend receipts represents an unrealistic investment
18 horizon from almost any perspective. Because stocks are not held by investors forever, the growth
19 in the share value (i.e., capital appreciation, or capital gains yield) is most relevant to investors'

1 total return expectations. Hence, investor expected returns in the equity market are provided by
2 capital appreciation of the investment as well as receipt of dividends. As such, the sale price of a
3 stock can be viewed as a liquidating dividend which can be discounted along with the annual
4 dividend receipts during the investment holding period to arrive at the investor expected return.

5 In its constant growth form, the DCF assumes that with a constant return on book common
6 equity and constant dividend payout ratio, a firm's earnings per share, dividends per share and book
7 value per share will grow at the same constant rate, absent any external financing by a firm.
8 Because these constant growth assumptions do not actually prevail in the capital markets, the
9 capital appreciation potential of an equity investment is best measured by the expected growth in
10 earnings per share. Since the traditional form of the DCF assumes no change in the price-earnings
11 multiple, the value of a firm's equity will grow at the same rate as earnings per share. Hence, the
12 capital gains yield is best measured by earnings per share growth using company-specific variables.

13 Investors consider both historical and projected data in the context of the expected growth
14 rate for a firm. An investor can compute historical growth rates using compound growth rates or
15 growth rate trend lines. Otherwise, an investor can rely upon published growth rates as provided
16 in widely-circulated, influential publications. However, a traditional constant growth DCF analysis
17 that is limited to such inputs suffers from the assumption of no change in the price-earnings
18 multiple, i.e., that the value of a firm's equity will grow at the same rate as earnings. Some of the
19 factors which actually contribute to investors' expectations of earnings growth and which should
20 be considered in assessing those expectations, are: (i) the earnings rate on existing equity, (ii) the
21 portion of earnings not paid out in dividends, (iii) sales of additional common equity, (iv)

1 reacquisition of common stock previously issued, (v) changes in financial leverage, (vi)
2 acquisitions of new business opportunities, (vii) profitable liquidation of assets, and (viii)
3 repositioning of existing assets. The realities of the equity market regarding total return
4 expectations, however, also reflect factors other than these inputs. Therefore, the DCF model
5 contains overly restrictive limitations when the growth component is stated in terms of earnings
6 per share (the basis for the capital gains yield) or dividends per share (the basis for the infinite
7 dividend discount model). In these situations, there is inadequate recognition of the capital gains
8 yields arising from stock price growth which could exceed earnings or dividends growth.

9 To assess the growth component of the DCF, analysts' projections of future growth
10 influence investor expectations as explained above. One influential publication is The Value Line
11 Investment Survey which contains estimated future projections of growth. The Value Line
12 Investment Survey provides growth estimates which are stated within a common economic
13 environment for the purpose of measuring relative growth potential. The basis for these projections
14 is the Value Line 3 to 5 year hypothetical economy. The Value Line hypothetical economic
15 environment is represented by components and subcomponents of the National Income Accounts
16 which reflect in the aggregate assumptions concerning the unemployment rate, manpower
17 productivity, price inflation, corporate income tax rate, high-grade corporate bond interest rates,
18 and Fed policies. Individual estimates begin with the correlation of sales, earnings and dividends
19 of a company to appropriate components or subcomponents of the future National Income
20 Accounts. These calculations provide a consistent basis for the published forecasts. Value Line's
21 evaluation of a specific company's future prospects are considered in the context of specific

1 operating characteristics that influence the published projections. Of particular importance for
2 regulated firms, Value Line considers the regulatory quality, rates of return recently authorized, the
3 historic ability of the firm to actually experience the authorized rates of return, the firm's budgeted
4 capital spending, the firm's financing forecast, and the dividend payout ratio. The wide circulation
5 of this source and frequent reference to Value Line in financial circles indicate that this publication
6 has an influence on investor judgment with regard to expectations for the future.

7 There are other sources of earnings growth forecasts. One of these sources is the
8 Institutional Brokers Estimate System ("IBES"). The IBES service provides data on consensus
9 earnings per share forecasts and five-year earnings growth rate estimates. The earnings estimates
10 are obtained from financial analysts at brokerage research departments and from institutions whose
11 securities analysts are projecting earnings for companies in the IBES universe of companies. The
12 IBES forecasts provide the basis for the earnings estimates published in the S&P Earnings Guide
13 which covers 3000 publicly traded stocks. Other services that tabulate earnings forecasts and
14 publish them are Zacks Investment Research, First Call/Thomson Financial, and Market Guide.
15 As with the IBES forecasts, Zacks, First Call/Thomson and Market Guide provide consensus
16 forecasts collected from analysts for most publically traded companies.

17 In each of these publications, forecasts of earnings per share for the current and subsequent
18 year receive prominent coverage. That is to say, IBES, Zacks, First Call/Thomson, Market Guide,
19 and Value Line show estimates of current-year earnings and projections for the next year. While
20 the DCF model typically focusses upon long-run estimates of growth, stock prices are clearly
21 influenced by current and near-term earnings prospects. Therefore, the near-term earnings per

1 share growth rates should also be factored into a growth rate determination.

2 Although forecasts of future performance are investor influencing², equity investors may
3 also rely upon the observations of past performance. Investors' expectations of future growth rates
4 may be determined, in part, by an analysis of historical growth rates. It is apparent that any serious
5 investor would advise himself/herself of historical performance prior to taking an investment
6 position in a firm. Earnings per share and dividends per share represent the principal financial
7 variables which influence investor growth expectations.

8 Other financial variables are sometimes considered in rate case proceedings. For example,
9 a company's internal growth rate, derived from the return rate on book common equity and the
10 related retention ratio, is sometimes considered. This growth rate measure is represented by the
11 Value Line forecast "BxR" shown on Schedule 7. Internal growth rates are often used as a proxy
12 for book value growth. Unfortunately, this measure of growth is often not reflective of investor-
13 expected growth. This is especially important when there is an indication of a prospective change
14 in dividend payout ratio, earned return on book common equity, change in market-to-book ratios
15 or other fundamental changes in the character of the business. Nevertheless, I have also shown the
16 historical and projected growth rates in book value per share and internal growth rates.

17 **Leverage Adjustment**

18 As noted previously, the divergence of stock prices from book values creates a conflict
19 within the DCF model when the results of a market-derived cost of equity are applied to the

² As shown in a National Bureau of Economic Research monograph by John G. Cragg and Burton G. Malkiel, Expectations and the Structure of Share Prices, University of Chicago Press 1982.

1 common equity account measured at book value in the ratesetting context. This is the situation
2 today where the market price of stock exceeds its book value for most companies. This divergence
3 of price and book value also creates a financial risk difference, whereby the capitalization of a
4 utility measured at its market value contains relatively less debt and more equity than the
5 capitalization measured at its book value. It is a well-accepted fact of financial theory that a
6 relatively higher proportion of equity in the capitalization has less financial risk than another capital
7 structure more heavily weighted with debt. This is the situation for the Barometer Group where
8 the market value of its capitalization contains more equity than is shown by the book capitalization.
9 The following comparison demonstrates this situation where the market capitalization is developed
10 by taking the "Fair Value of Financial Instruments" (Disclosures about Fair Value of Financial
11 Instruments -- Statement of Financial Accounting Standards ("FAS") No. 107) as shown in the
12 annual report for these companies and the market value of the common equity using the price of
13 stock. The comparison of capital structure ratios is:

14	Barometer	Capitalization at Market Value	Capitalization at Book Value
15	<u>Group</u>	<u>(Fair Value)</u>	<u>(Carrying Amounts)</u>
16			
17	Long-term Debt	34.36%	47.04%
18	Preferred Stock	1.89	2.43
19	Common Equity	<u>63.76</u>	<u>50.53</u>
20			
21	Total	<u>100.00%</u>	<u>100.00%</u>
22			

23 With regard to the capital structure ratios represented by the carrying amounts shown above, there
24 are some variances from the ratios shown on Schedule 3. These variances arise from the use of
25 balance sheet values in computing the capital structure ratios shown on Schedule 3 and the use of

1 the Carrying Amounts of the Financial Instruments according to FAS 107 (the Carrying Amounts
2 were used in the table shown above to be comparable to the Fair Value amounts used in the
3 comparison calculations).

4 With the capital ratios calculated above, it is necessary to first calculate the cost of equity
5 for a firm without any leverage. The cost of equity for an unleveraged firm using the capital
6 structure ratios calculated with market values is:

$$7 \quad k_u = k_e - (((k_u - i) (1-t) D / E) - (k_u - d) P / E)$$

$$8 \quad 10.15\% = 11.28\% - (((10.15\% - 7.17\%) .65) 34.36\% / 63.76\%) - (10.15\% - 7.25\%) 1.89\% / 63.76\%$$

9 where k_u = cost of equity for an all-equity firm, k_e = market determined cost equity, i = cost of
10 debt³, d = dividend rate on preferred stock⁴, D = debt ratio, P = preferred stock ratio, and E =
11 common equity ratio. The formula shown above indicates that the cost of equity for a firm with
12 100% equity is 10.15% using the market value of the Barometer Group's capitalization. Having
13 determined that the cost of equity is 10.15% for a firm with 100% equity, the rate of return on
14 common equity associated with the book value capital structure is:

$$15 \quad k_e = k_u + (((k_u - i) (1-t) D / E) + (k_u - d) P / E)$$

$$16 \quad 12.10\% = 10.15\% + (((10.15\% - 7.17\%) .65) 47.04\% / 50.53\%) + (10.15\% - 7.25\%) 2.43\% / 50.53\%$$

³ The cost of debt is the six-month average yield on Moody's A rated public utility bonds.

⁴ The cost of preferred is the six-month average yield on Moody's "a" rated preferred stock.

INTEREST RATES

Interest rates can be viewed in their traditional nominal terms (i.e., the stated rate of interest) and in real terms (i.e., the stated rate of interest less the expected rate of inflation). Absent consideration of inflation, the real rate of interest is determined generally by supply factors which are influenced by investors willingness to forego current consumption (i.e., to save) and demand factors that are influenced by the opportunities to derive income from productive investments. Added to the real rate of interest is compensation required by investors for the inflationary impact of the declining purchasing power of their income received in the future. While interest rates are clearly influenced by the changing annual rate of inflation, it is important to note that the expected rate of inflation, that is reflected in current interest rates, may be quite different than the prevailing rate of inflation.

Rates of interest also vary by the type of interest bearing instrument. Investors require compensation for the risk associated with the term of the investment and the risk of default. The risk associated with the term of the investment is usually shown by the yield curve, i.e., the difference in rates across maturities. The typical structure is represented by a positive yield curve which provides progressively higher interest rates as the maturities are lengthened. Flat (i.e., relatively level rates across maturities) or inverted (i.e., higher short-term rates than long-term rates) yield curves occur less frequently.

The risk of default is typically associated with the creditworthiness of the borrower. Differences in interest rates can be traced to the credit quality ratings assigned by the bond rating agencies, such as Moody's Investors Service, Inc. and Standard & Poor's Corporation. Obligations

1 of the United States Treasury are usually considered to be free of default risk, and hence reflect
2 only the real rate of interest, compensation for expected inflation, and maturity risk. The Treasury
3 has been issuing inflation-indexed notes which automatically provide compensation to investors
4 for future inflation, thereby providing a lower current yield on these issues.

5 **Interest Rate Environment**

6 Federal Reserve Board ("Fed") policy actions which impact directly short-term interest rates
7 also substantially affect investor sentiment in long-term fixed-income securities markets. In this
8 regard, the Fed has often pursued policies designed to build investor confidence in the fixed-
9 income securities market. Formative Fed policy has had a long history, as exemplified by the
10 historic 1951 Treasury-Federal Reserve Accord, and more recently, deregulation within the
11 financial system which increased the level and volatility of interest rates. The Fed has indicated
12 that it will follow a monetary policy designed to promote noninflationary economic growth.

13 As background to the recent levels of interest rates, history shows that the Open Market
14 Committee of the Federal Reserve board ("FOMC") began a series of moves toward lower short-
15 term interest rates in mid-1990 -- at the outset of the last recession. Monetary policy was
16 influenced at that time by (i) steps taken to reduce the federal budget deficit, (ii) slowing economic
17 growth, (iii) rising unemployment, and (iv) measures intended to avoid a credit crunch. Thereafter,
18 the Federal government initiated several bold proposals to deal with future borrowings by the
19 Treasury. With lower expected federal budget deficits and reduced Treasury borrowings, together
20 with limitations on the supply of new 30-year Treasury bonds, long-term interest rates declined to
21 a twenty-year low, reaching a trough of 5.78% in October 1993.

1 On February 4, 1994, the FOMC began a series of increases in the Fed Funds rate (i.e., the
2 interest rate on excess overnight bank reserves). The initial increase represented the first rise in
3 short-term interest rates in five years. The series of seven increases doubled the Fed Funds rate to
4 6%. The increases in short-term interest rates also caused long-term rates to move up, continuing
5 a trend which began in the fourth quarter of 1993. The cyclical peak in long-term interest rates was
6 reached on November 7 and 14, 1994 when 30-year Treasury bonds attained an 8.16% yield.
7 Thereafter, long-term Treasury bond yields generally declined.

8 Beginning in mid-February 1996, long-term interest rates moved upward from their
9 previous lows. After initially reaching a level of 6.75% on March 15, 1996, long-term interest rates
10 continued to climb and reached a peak of 7.19% on July 5 and 8, 1996. For the period leading up
11 to the 1996 Presidential election, long-term Treasury bonds generally traded within this range.
12 After the election, interest rates moderated, returning to a level somewhat below the previous
13 trading range. Thereafter, in December 1996, interest rates returned to a range of 6.5% to 7.0%
14 which existed for much of 1996.

15 On March 25, 1997, the FOMC decided to tighten monetary conditions through a one-
16 quarter percentage point increase in the Fed Funds rate. This tightening increased the Fed Funds
17 rate to 5.5%, although the discount rate was not changed and remained at 5%. In making this
18 move, the FOMC stated that it was concerned by persistent strength of demand in the economy,
19 which it feared would increase the risk of inflationary imbalances that could eventually interfere
20 with the long economic expansion.

21 In the fourth quarter of 1997, the yields on Treasury bonds began to decline rapidly in

1 response to an increase in demand for Treasury securities caused by a flight to safety triggered by
2 the currency and stock market crisis in Asia. Liquidity provided by the Treasury market makes
3 these bonds an attractive investment in times of crisis. This is because Treasury securities
4 encompass a very large market which provides ease of trading and carry a premium for safety.
5 During the fourth quarter of 1997, Treasury bond yields pierced the psychologically important 6%
6 level for the first time since 1993.

7 Through the first half of 1998, the yields on long-term Treasury bonds fluctuated within a
8 range of about 5.6% to 6.1% reflecting their attractiveness and safety. In the third quarter of 1998,
9 there was further deterioration of investor confidence in global financial markets. This loss of
10 confidence followed the moratorium (i.e., default) by Russia on its sovereign debt and fears
11 associated with problems in Latin America. While not significant to the global economy in the
12 aggregate, the August 17 default by Russia had a significant negative impact on investor
13 confidence, following earlier discontent surrounding the crisis in Asia. These events subsequently
14 led to a general pull back of risk-taking as displayed by banks growing reluctance to lend, worries
15 of an expanding credit crunch, lower stock prices, and higher yields on bonds of riskier companies.
16 These events contributed to the failure of the hedge fund, Long-Term Capital Management.

17 In response to these events, the FOMC cut the Fed Funds rate just prior to the mid-term
18 Congressional elections. The FOMC's action was based upon concerns over how increasing
19 weakness in foreign economies would affect the U.S. economy. As recently as July 1998, the
20 FOMC had been more concerned about fighting inflation than the state of the economy. The initial
21 rate cut was the first of three reductions by the FOMC. Thereafter, the yield on long-term Treasury

1 bonds reached a 30-year low of 4.70% on October 5, 1998. Long-term Treasury yields below 5%
2 had not been seen since 1967. Unlike the first rate cut that was widely anticipated, the second rate
3 reduction by the FOMC was a surprise to the markets. A third reduction in short-term interest rates
4 occurred in November 1998 when the FOMC reduced the discount rate to 4.5% and the Fed Funds
5 rate to 4.75%.

6 All of these events prompted an increase in the prices for Treasury bonds which lead to the
7 low yields described above. Another factor that contributed to the decline in yields on long-term
8 Treasury bonds was a reduction in the supply of new Treasury issues coming to market due to the
9 Federal budget surplus -- the first in nearly 30 years. The dollar amount of Treasury bonds being
10 issued declined by 30% in two years thus resulting in higher prices and lower yields. In addition,
11 rumors of some struggling hedge funds unwinding their positions further added to the gains in
12 Treasury bond prices.

13 The financial crisis that spread from Asia to Russia and to Latin America pushed nervous
14 investors from stocks into Treasury bonds, thus increasing demand for bonds, just when supply was
15 shrinking. There was also a move from corporate bonds to Treasury bonds to take advantage of
16 appreciation in the Treasury market. This resulted in a certain amount of exuberance for Treasury
17 bond investments that formerly was reserved for the stock market. Moreover, yields in the fourth
18 quarter of 1998 became extremely volatile as shown by Treasury yields that fell from 5.10% on
19 September 29 to 4.70 percent on October 5, and thereafter returned to 5.10% on October 13. A
20 decline and rebound of 40 basis points in Treasury yields in a two-week time frame is remarkable.

21 Beginning in mid-1999, the FOMC raised interest rates on six occasions reversing its

1 actions in the fall of 1998. On June 30, 1999, August 24, 1999, November 16, 1999, February 2,
2 2000, March 21, 2000, and May 16, 2000, the FOMC raised the Fed Funds rate to 6.50%. This
3 brought the Fed Funds rate to its highest level since 1991, and was 175 basis points higher than the
4 level that occurred at the height of the Asian currency and stock market crisis. Similarly, the
5 FOMC increased the discount rate to 6.00% with its actions on August 24, 1999, November 16,
6 1999, February 2, 2000, March 21, 2000, and May 16, 2000. This brought the discount rate up by
7 one and one-half percentage points from its low in the fourth quarter of 1998. At the time, these
8 actions were taken in response to more normally functioning financial markets, tight labor markets,
9 and a reversal of the monetary ease that was required earlier in response to the global financial
10 market turmoil.

11 As the year 2000 drew to a close, economic activity slowed and consumer confidence began
12 to weaken. In two steps at the beginning and at the end of January 2001, the FOMC reduced the
13 Fed Funds rate by one percentage point. These actions brought the Fed Funds rate to 5.50% and
14 the discount rate was also lowered to 5.00%. The FOMC described its actions as "a rapid and
15 forceful response of monetary policy" to eroding consumer and business confidence exemplified
16 by weaker retail sales and business spending on capital equipment and cut backs in manufacturing
17 production. Subsequently, on March 20, 2001, April 18, 2001, May 15, 2001, June 27, 2001, and
18 August 21, 2001, the FOMC lowered the Fed Funds and discount rate in steps consisting of three
19 50 basis points decrements followed by two 25 basis points decrement. These actions took the Fed
20 Funds rate to 3.50% and the discount rate to 3.00%. The FOMC observed on August 21, 2001:

21

1 "Household demand has been sustained, but business profits and
2 capital spending continue to weaken and growth abroad is slowing,
3 weighing on the U.S. economy. The associated easing of pressures
4 on labor and product markets is expected to keep inflation
5 contained.

6
7 Although long-term prospects for productivity growth and the
8 economy remain favorable, the Committee continues to believe
9 that against the background of its long-run goals of price stability
10 and sustainable economic growth and of the information currently
11 available, the risks are weighted mainly toward conditions that
12 may generate economic weakness in the foreseeable future."

13
14 After the terrorist attack on September 11, 2001, the FOMC made two additional 50 basis points
15 reductions in the Fed Funds rate and discount rate. The first reduction occurred on September 17,
16 2001 and followed the four-day closure of the financial markets following the terrorist attacks. The
17 second reduction occurred at the October 2 meeting of the FOMC where it observed:

18 "The terrorist attacks have significantly heightened uncertainty in
19 an economy that was already weak. Business and household
20 spending as a consequence are being further damped. Nonetheless,
21 the long-term prospects for productivity growth and the economy
22 remain favorable and should become evident once the unusual
23 forces restraining demand abate."

24
25 Afterward, the FOMC reduced the Fed Funds rate and discount rate by 50 basis points on
26 November 6, 2001 and by 25 basis points on December 11, 2001. In total, short-term interest rates
27 were reduced by the FOMC eleven (11) times during the year 2001. These actions cut the Fed
28 Funds rate and discount rates by 4.75% and resulted in 1.75% for the Fed Funds rate and 1.25%
29 for the discount rate at year-end 2001.

30 In an attempt to deal with weakening fundamentals in the economy recovering from the
31 recession that began in March 2001, the FOMC provided a psychologically important one-half

1 percentage point reduction in the federal funds rate and discount rate. The rate cut was twice as
2 large as the market expected, and brought the fed funds rate to 1.25% and the discount rate to
3 0.75% on November 6, 2002. The FOMC stated that:

4 "The Committee continues to believe that an accommodative
5 stance of monetary policy, coupled with still-robust underlying
6 growth in productivity, is providing important ongoing support to
7 economic activity. However, incoming economic data have tended
8 to confirm that greater uncertainty, in part attributable to
9 heightened geopolitical risks, is currently inhibiting spending,
10 production, and employment. Inflation and inflation expectations
11 remain well contained.

12
13 In these circumstances, the Committee believes that today's
14 additional monetary easing should prove helpful as the economy
15 works its way through this current soft spot. With this action, the
16 Committee believes that, against the background of its long-run
17 goals of price stability and sustainable economic growth and of the
18 information currently available, the risks are balanced with respect
19 to the prospects for both goals in the foreseeable future."
20

21 **Public Utility Bond Yields**

22 The Risk Premium analysis of the cost of equity is represented by the combination of a
23 firm's borrowing rate for long-term debt capital plus a premium that is required to reflect the
24 additional risk associated with the equity of a firm as explained in Appendix G. Due to the senior
25 nature of the long-term debt of a firm, its cost is lower than the cost of equity due to the prior claim
26 which lenders have on the earnings and assets of a corporation.

27 As a generalization, all interest rates track to varying degrees of the benchmark yields
28 established by the market for Treasury securities. Public utility bond yields usually reflect the
29 underlying Treasury yield associated with a given maturity plus a spread to reflect the specific

1 credit quality of the issuing public utility. Market sentiment can also have an influence on the
2 spreads as described below. The spread in the yields on public utility bonds and Treasury bonds
3 varies with market conditions, as does the relative level of interest rates at varying maturities shown
4 by the yield curve.

5 Pages 1 and 2 of Schedule 8 provide the recent history of long-term (i.e., maturities as close
6 as possible to 30 years) public utility bond yields for each of the "investment grades" (i.e., Aaa, Aa,
7 A and Baa). The top four rating categories shown on Schedule 8 are generally regarded as eligible
8 for bank investments under commercial banking regulations. These investment grades are
9 distinguished from "junk" bonds which have ratings of Ba and below.

10 A relatively long history of the spread between the yields on long-term A rated public
11 utility bonds and long-term Treasury bonds is shown on page 3 of Schedule 8. There, it is shown
12 that the spread in these yields declined after the 1987 stock market crash. Those spreads stabilized
13 at about the one percentage point level for the years 1992 through 1997. With the aversion to risk
14 and flight to quality described earlier, a significant widening of the spread in the yields between
15 corporate (e.g., public utility) and Treasury bonds developed in 1998, after an initial widening of
16 the spread that began in the fourth quarter of 1997. The significant widening of spreads in 1998
17 was unexpected by some technically savvy investors, as shown by the debacle at the Long-Term
18 Capital Management hedge fund. When Russia defaulted its debt on August 17, some investors
19 had to cover short positions when Treasury prices spiked upward. Short covering by investors that
20 guessed wrong on the relationship between corporate and Treasury bonds also contributed to run-up
21 in Treasury bond prices by increasing the demand for them. This helped to contribute to a

1 widening of the spreads between corporate and Treasury bonds.

2 As indicated by the dynamics described earlier, there has been a disconnection from the
3 previous relationship between the yields on corporate debt and Treasury bonds. As shown on page
4 3 of Schedule 8, the spread in yields between A rated public utility bonds and long-term Treasury
5 bonds widened from about one percentage point prior to 1998 to 1.46% in 1998, 1.75% in 1999,
6 2.30% in 2000, and 2.27% in 2001. In essence, the cost of corporate debt and equity has
7 disconnected from the yields on long-term Treasury bonds due to a general aversion to risk and the
8 shrinking supply of long-term Treasury bonds. As shown by the monthly data presented on pages
9 4 and 5 of Schedule 8, the interest rate spread between the yields on long-term Treasury bonds and
10 A rated public utility bonds was 1.95 percentage points for the twelve-months ended December
11 2002. For the six- and three-month periods ending December 2002, the yield spread was 2.02%
12 and 2.07%, respectively. This situation continues to point to the high cost of corporate capital vis-
13 à-vis the yield on Treasury obligations.

14 **Risk-Free Rate of Return in the CAPM**

15 Regarding the risk-free rate of return (see Appendix H), pages 2 and 3 of Schedule 10
16 provide the yields on the broad spectrum of Treasury Notes and Bonds. Some practitioners of the
17 CAPM would advocate the use of short-term treasury yields (and some would argue for the yields
18 on 91-day Treasury Bills). Other advocates of the CAPM would advocate the use of longer-term
19 treasury yields as the best measure of a risk-free rate of return. As Ibbotson has indicated:

20 The Cost of Capital in a Regulatory Environment. When discounting
21 cash flows projected over a long period, it is necessary to discount them

1 by a long-term cost of capital. Additionally, regulatory processes for
2 setting rates often specify or suggest that the desired rate of return for a
3 regulated firm is that which would allow the firm to attract and retain
4 debt and equity capital over the long term. Thus, the long-term cost of
5 capital is typically the appropriate cost of capital to use in regulated
6 ratesetting. (Stocks, Bonds, Bills and Inflation - 1992 Yearbook, pages
7 118-119)
8

9 As indicated above, long-term Treasury bond yields represent the correct measure of the risk-free
10 rate of return in the traditional CAPM. Very short term yields on Treasury bills should be avoided
11 for several reasons. First, rates should be set on the basis of financial conditions that will exist
12 during the effective period of the proposed rates. Second, 91-day Treasury bill yields are more
13 volatile than longer-term yields and are greatly influenced by FOMC monetary policy, political,
14 and economic situations. Moreover, Treasury bill yields have been shown to be empirically
15 inadequate for the CAPM. Some advocates of the theory would argue that the risk-free rate of
16 return in the CAPM should be derived from quality long-term corporate bonds.

RISK PREMIUM ANALYSIS

The cost of equity requires recognition of the risk premium required by common equities over long-term corporate bond yields. In the case of senior capital, a company contracts for the use of long-term debt capital at a stated coupon rate for a specific period of time and in the case of preferred stock capital at a stated dividend rate, usually with provision for redemption through sinking fund requirements. In the case of senior capital, the cost rate is known with a high degree of certainty because the payment for use of this capital is a contractual obligation, and the future Schedule of payments is known. In essence, the investor-expected cost of senior capital is equal to the realized return over the entire term of the issue, absent default.

The cost of equity, on the other hand, is not fixed, but rather varies with investor perception of the risk associated with the common stock. Because no precise measurement exists as to the cost of equity, informed judgment must be exercised through a study of various market factors which motivate investors to purchase common stock. In the case of common equity, the realized return rate may vary significantly from the expected cost rate due to the uncertainty associated with earnings on common equity. This uncertainty highlights the added risk of a common equity investment.

As one would expect from traditional risk and return relationships, the cost of equity is affected by expected interest rates. As noted in Appendix F, yields on long-term corporate bonds traditionally consist of a real rate of return without regard to inflation, an increment to reflect investor perception of expected future inflation, the investment horizon shown by the term of the issue until maturity, and the credit risk associated with each rating category.

The Risk Premium approach recognizes the required compensation for the more risky common equity over the less risky secured debt position of a lender. The cost of equity stated in terms of the familiar risk premium approach is:

$$4 \qquad k=i+RP$$

5 where, the cost of equity (" k ") is equal to the interest rate on long-term corporate debt (" i "), plus
6 an equity risk premium (" RP ") which represents the additional compensation for the riskier
7 common equity.

8 Equity Risk Premium

The equity risk premium is determined as the difference in the rate of return on debt capital and the rate of return on common equity. Because the common equity holder has only a residual claim on earnings and assets, there is no assurance that achieved returns on common equities will equal expected returns. This is quite different from returns on bonds, where the investor realizes the expected return during the entire holding period, absent default. It is for this reason that common equities are always more risky than senior debt securities. There are investment strategies available to bond portfolio managers that immunize bond returns against fluctuations in interest rates because bonds are redeemed through sinking funds or at maturity, whereas no such redemption is mandated for public utility common equities.

18 It is well recognized that the expected return on more risky investments will exceed the
19 required yield on less risky investments. Neither the possibility of default on a bond nor the
20 maturity risk detracts from the risk analysis, because the common equity risk rate differential (i.e.,
21 the investor-required risk premium) is always greater than the return components on a bond. It

1 should also be noted that the investment horizon is typically long-run for both corporate debt and
2 equity, and that the risk of default (i.e., corporate bankruptcy) is a concern to both debt and equity
3 investors. Thus, the required yield on a bond provides a benchmark or starting point with which
4 to track and measure the cost rate of common equity capital. There is no need to segment the bond
5 yield according to its components, because it is the total return demanded by investors that is
6 important for determining the risk rate differential for common equity. This is because the
7 complete bond yield provides the basis to determine the differential, and as such, consistency
8 requires that the computed differential must be applied to the complete bond yield when applying
9 the risk premium approach. To apply the risk rate differential to a partial bond yield would result
10 in a misspecification of the cost of equity because the computed differential was initially
11 determined by reference to the entire bond return.

12 The risk rate differential between the cost of equity and the yield on long-term corporate
13 bonds can be determined by reference to a comparison of holding period returns (here defined as
14 one year) computed over long time spans. This analysis assumes that over long periods of time
15 investors' expectations are on average consistent with rates of return actually achieved.
16 Accordingly, historical holding period returns must not be analyzed over an unduly short period
17 because near-term realized results may not have fulfilled investors' expectations. Moreover,
18 specific past period results may not be representative of investment fundamentals expected for the
19 future. This is especially apparent when the holding period returns include negative returns which
20 are not representative of either investor requirements of the past or investor expectations for the
21 future. The short-run phenomenon of unexpected returns (either positive or negative) demonstrates

1 that an unduly short historical period would not adequately support a risk premium analysis. It is
2 important to distinguish between investors' motivation to invest, which encompass positive return
3 expectations, and the knowledge that losses can occur. No rational investor would forego payment
4 for the use of capital, or expect loss of principal, as a basis for investing. Investors will hold cash
5 rather than invest with the expectation of a loss.

6 Within these constraints, page 1 of Schedule 9 provides the historical holding period returns
7 for the S&P Public Utility Index which has been independently computed and the historical holding
8 period returns for the S&P Composite Index which have been reported in Stocks, Bonds, Bills and
9 Inflation published by Ibbotson & Associates. The tabulation begins with 1928 because January
10 1928 is the earliest monthly dividend yield for the S&P Public Utility Index. I have considered all
11 reliable data for this study to avoid the introduction of a particular bias to the results. The
12 measurement of the common equity return rate differential is based upon actual capital market
13 performance using realized results. As a consequence, the underlying data for this risk premium
14 approach can be analyzed with a high degree of precision. Informed professional judgment is
15 required only to interpret the results of this study, but not to quantify the component variables.

16 The risk rate differentials for all equities, as measured by the S&P Composite, are
17 established by reference to long-term corporate bonds. For public utilities, the risk rate differentials
18 are computed with the S&P Public Utilities as compared with public utility bonds.

19 The measurement procedure used to identify the risk rate differentials consisted of
20 arithmetic means, geometric means, and medians for each series. Measures of central tendency of
21 the results from the historical periods provide the best indication of representative rates of return.

1 In regulated ratesetting, the correct measure of the equity risk premium is the arithmetic mean
2 because a utility must expect to earn its cost of capital in each year in order to provide investors
3 with their long-term expectations. In other contexts, such as pension determinations, compound
4 rates of return, as shown by the geometric means, may be appropriate. The median returns are also
5 appropriate in ratesetting because they are a measure of the central tendency of a single period rate
6 of return. Median values have also been considered in this analysis because they provide a return
7 which divides the entire series of annual returns in half and are representative of a return that
8 symbolizes, in a meaningful way, the central tendency of all annual returns contained within the
9 analysis period. Medians are regularly included in many investor-influencing publications.

10 As previously noted, the arithmetic mean provides the appropriate point estimate of the risk
11 premium. As further explained in Appendix H, the long-term cost of capital in rate cases requires
12 the use of the arithmetic means. To supplement my analysis, I have also used the rates of return
13 taken from the geometric mean and median for each series to provide the bounds of the range to
14 measure the risk rate differentials. This further analysis shows that when selecting the midpoint
15 from a range established with the geometric means and medians, the arithmetic mean is indeed a
16 reasonable measure for the long-term cost of capital. For the years 1928 through 2001, the risk
17 premiums for each class of equity are:

	<u>S&P Composite</u>	<u>S&P Public Utilities</u>
Arithmetic Mean	<u>6.27%</u>	<u>5.32%</u>
Geometric Mean	4.65%	3.28%
Median	<u>11.37%</u>	<u>6.71%</u>
Midpoint of Range	<u>8.01%</u>	<u>5.00%</u>
Average	<u>7.14%</u>	<u>5.16%</u>

The empirical evidence suggests that the common equity risk premium is higher for the S&P Composite Index compared to the S&P Public Utilities.

If, however, specific historical periods were also analyzed in order to match more closely historical fundamentals with current expectations, the results provided on page 2 of Schedule 9 should also be considered. One of these sub-periods included the 50-year period, 1952-2001. These years follow the historic 1951 Treasury-Federal Reserve Accord which affected monetary policy and the market for government securities.

A further investigation was undertaken to determine whether realignment has taken place subsequent to the historic 1973 Arab Oil embargo and during the deregulation of the financial markets. In each case, the public utility risk premiums were computed by using the arithmetic mean, and the geometric means and medians to establish the range shown by those values. The time periods covering the more recent periods 1974 through 2001 and 1979 through 2001 contain events subsequent to the initial oil shock and the advent of monetarism as Fed policy, respectively.

For the 50-year, 28-year and 23-year periods, the public utility risk premiums were 5.96%, 5.24%, and 5.39% respectively, as shown by the average of the specific point-estimates and the midpoint

1 of the ranges provided on page 2 of Schedule 9.

1 **CAPITAL ASSET PRICING MODEL**

2 Modern portfolio theory provides a theoretical explanation of expected returns on portfolios
3 of securities. The Capital Asset Pricing Model ("CAPM") attempts to describe the way prices of
4 individual securities are determined in efficient markets where information is freely available and
5 is reflected instantaneously in security prices. The CAPM states that the expected rate of return
6 on a security is determined by a risk-free rate of return plus a risk premium which is proportional
7 to the non-diversifiable (or systematic) risk of a security.

8 The CAPM theory has several unique assumptions that are not common to most other
9 methods used to measure the cost of equity. As with other market-based approaches, the CAPM
10 is an expectational concept. There has been significant academic research conducted that found
11 that the empirical market line, based upon historical data, has a less steep slope and higher intercept
12 than the theoretical market line of the CAPM. For equities with a beta less than 1.0, such as utility
13 common stocks, the CAPM theoretical market line will underestimate the realistic expectation of
14 investors in comparison with the empirical market line which shows that the CAPM may
15 potentially misspecify investors' required return.

16 The CAPM considers changing market fundamentals in a portfolio context. The balance
17 of the investment risk, or that characterized as unsystematic, must be diversified. Some argue that
18 diversifiable (unsystematic) risk is unimportant to investors. But this contention is not completely
19 justified because the business and financial risk of an individual company, including regulatory
20 risk, are widely discussed within the investment community and therefore influence investors in
21 regulated firms. In addition, I note that the CAPM assumes that through portfolio diversification,

1 investors will minimize the effect of the unsystematic (diversifiable) component of investment risk.
2 Because it is not known whether the average investor holds a well-diversified portfolio, the CAPM
3 must also be used with other models of the cost of equity.

4 To apply the traditional CAPM theory, three inputs are required: the beta coefficient (" β "),
5 a risk-free rate of return (" R_f "), and a market premium (" $R_m - R_f$ "). The cost of equity stated in
6 terms of the CAPM is:

7
$$k = R_f + \beta (R_m - R_f)$$

8 As previously indicated, it is important to recognize that the academic research has shown
9 that the security market line was flatter than that predicted by the CAPM theory and it had a higher
10 intercept than the risk-free rate. These tests indicated that for portfolios with betas less than 1.0,
11 the traditional CAPM would understate the return for such stocks. Likewise, for portfolios with
12 betas above 1.0, these companies had lower returns than indicated by the traditional CAPM theory.

13 Once again, CAPM assumes that through portfolio diversification investors will minimize the
14 effect of the unsystematic (diversifiable) component of investment risk. Therefore, the CAPM
15 must also be used with other models of the cost of equity, especially when it is not known whether
16 the average public utility investor holds a well-diversified portfolio.

17 **Beta**

18 The beta coefficient is a statistical measure which attempts to identify the non-diversifiable
19 (systematic) risk of an individual security and measures the sensitivity of rates of return on a
20 particular security with general market movements. Under the CAPM theory, a security that has
21 a beta of 1.0 should theoretically provide a rate of return equal to the return rate provided by the

1 market. When employing stock price changes in the derivation of beta, a stock with a beta of 1.0
2 should exhibit a movement in price which would track the movements in the overall market prices
3 of stocks. Hence, if a particular investment has a beta of 1.0, a one percent increase in the return
4 on the market will result, on average, in a one percent increase in the return on the particular
5 investment. An investment which has a beta less than 1.0 is considered to be less risky than the
6 market.

7 The beta coefficient (" β "), the one input in the CAPM application which specifically applies
8 to an individual firm, is derived from a statistical application which regresses the returns on an
9 individual security (dependent variable) with the returns on the market as a whole (independent
10 variable). The beta coefficients for utility companies typically describe a small proportion of the
11 total investment risk because the coefficients of determination (R^2) are low.

12 Page 1 of Schedule 10 provides the betas published by Value Line. By way of explanation,
13 the Value Line beta coefficient is derived from a "straight regression" based upon the percentage
14 change in the weekly price of common stock and the percentage change weekly of the New York
15 Stock Exchange Composite average using a five-year period. The raw historical beta is adjusted
16 by Value Line for the measurement effect resulting in overestimates in high beta stocks and
17 underestimates in low beta stocks. Value Line then rounds its betas to the nearest .05 increment.
18 Value Line does not consider dividends in the computation of its betas.

19 **Market Premium**
20

21 The final element necessary to apply the CAPM is the market premium. The market
22 premium by definition is the rate of return on the total market less the risk-free rate of return (" R_m

1 - R_f). In this regard, the market premium in the CAPM has been calculated from the total return
2 on the market of equities using forecast and historical data. The future market return is established
3 with forecasts by Value Line using estimated dividend yields and capital appreciation potential.

4 With regard to the forecast data, I have relied upon the Value Line forecasts of capital
5 appreciation and the dividend yield on the 1,700 stocks in the Value Line Survey. According to
6 the December 27, 2002, edition of The Value Line Investment Survey Summary and Index, (see
7 page 5 of Schedule 10) the total return on the universe of Value Line equities is:

	Dividend		Median		Median
	Yield	+	Appreciation	=	Total
			Potential		Return
As of December 27, 2002	2.1%	+	15.83% ¹	=	17.93%

13 The tabulation shown above provides the dividend yield and capital gains yield of the companies
14 followed by Value Line. With the 17.93% forecast market return and the 5.25% risk-free rate of
15 return, a 12.68% (17.93% - 5.25%) market premium would be indicated using forecast market
16 data.
17

18 With regard to the historical data, I provided the rates of return from long-term historical
19 time periods that have been widely circulated among the investment and academic community over
20 the past several years, as shown on page 6 of Schedule 10. These data are published by Ibbotson
21 Associates in its Stocks, Bonds, Bills and Inflation ("SBBI"). From the data provided on page 6
22 of Schedule 10, I calculate a market premium using the common stock arithmetic mean returns of
23 12.7% less government bond arithmetic mean returns of 5.7%. For the period 1926-2001, the

¹ The estimated median appreciation potential is forecast to be 80% for 3 to 5 years hence. The annual

1 market premium was 7.0% (12.7% - 5.7%). I should note that the arithmetic mean must be used
2 in the CAPM because it is a single period model. It is further confirmed by Ibbotson who has
3 indicated:

4 *Arithmetic Versus Geometric Differences*

5 For use as the expected equity risk premium in the CAPM, the
6 *arithmetic* or *simple difference* of the *arithmetic* means of stock market
7 returns and riskless rates is the relevant number. This is because the
8 CAPM is an additive model where the cost of capital is the sum of its
9 parts. Therefore, the CAPM expected equity risk premium must be
10 derived by arithmetic, *not geometric*, subtraction.

11
12 *Arithmetic Versus Geometric Means*

13 The expected equity risk premium should always be calculated using the
14 arithmetic mean. The arithmetic mean is the rate of return which, when
15 compounded over multiple periods, gives the mean of the probability
16 distribution of ending wealth values. This makes the arithmetic mean
17 return appropriate for computing the cost of capital. The discount rate
18 that equates expected (mean) future values with the present value of an
19 investment is that investment's cost of capital. The logic of using the
20 discount rate as the cost of capital is reinforced by noting that investors
21 will discount their (mean) ending wealth values from an investment back
22 to the present using the arithmetic mean, for the reason given above.
23 They will therefore require such an expected (mean) return prospectively
24 (that is, in the present looking toward the future) to commit their capital
25 to the investment. (Stocks, Bonds, Bills and Inflation - 1996 Yearbook,
26 pages 153-154)

27
28 For the CAPM, a market premium of 9.84% ($7.0\% + 12.68\% = 19.68\% \div 2$) would be
29 reasonable which is the average of the 7.0% using historical data and a market premium of 12.68%
30 using forecasts.

capital gains yield at the midpoint of the forecast period is 15.83% (i.e., $1.80^{25} - 1$).

1 **COMPARABLE EARNINGS APPROACH**

2 Value Line's analysis of the companies that it follows includes a wide range of financial and
3 market variables, including nine items that provide ratings for each company. From these nine
4 items, one category has been removed dealing with industry performance because, under approach
5 employed, the particular business type is not significant. In addition, two categories have been
6 ignored that deal with estimates of current earnings and dividends because they are not useful for
7 comparative purposes. The remaining six categories provide relevant measures to establish
8 comparability. The definitions for each of the six criteria (from the Value Line Investment Survey
9 - Subscriber Guide) follows:

10 **Timeliness Rank**

11
12 The rank for a stock's probable relative market performance in the
13 year ahead. Stocks ranked 1 (Highest) or 2 (Above Average) are
14 likely to outpace the year-ahead market. Those ranked 4 (Below
15 Average) or 5 (Lowest) are not expected to outperform most stocks
16 over the next 12 months. Stocks ranked 3 (Average) will probably
17 advance or decline with the market in the year ahead. Investors
18 should try to limit purchases to stocks ranked 1 (Highest) or 2
19 (Above Average) for Timeliness.

20
21 **Safety Rank**

22
23 A measure of potential risk associated with individual common
24 stocks rather than large diversified portfolios (for which Beta is
25 good risk measure). Safety is based on the stability of price, which
26 includes sensitivity to the market (see Beta) as well as the stock's
27 inherent volatility, adjusted for trend and other factors including
28 company size, the penetration of its markets, product market
29 volatility, the degree of financial leverage, the earnings quality, and
30 the overall condition of the balance sheet. Safety Ranks range from
31 1 (Highest) to 5 (Lowest). Conservative investors should try to limit
32 purchases to equities ranked 1 (Highest) or 2 (Above Average) for

1 Safety.

2 Financial Strength

3
4 The financial strength of each of the more than 1,600 companies in
5 the VS II data base is rated relative to all the others. The ratings
6 range from A++ to C in nine steps. (For screening purposes, think
7 of an A rating as "greater than" a B). Companies that have the best
8 relative financial strength are given an A++ rating, indicating an
9 ability to weather hard times better than the vast majority of other
10 companies. Those who don't quite merit the top rating are given an
11 A+ grade, and so on. A rating as low as C++ is considered
12 satisfactory. A rating of C+ is well below average, and C is
13 reserved for companies with very serious financial problems. The
14 ratings are based upon a computer analysis of a number of key
15 variables that determine (a) financial leverage, (b) business risk, and
16 (c) company size, plus the judgment of Value Line's analysts and
17 senior editors regarding factors that cannot be quantified across-the-
18 board for companies. The primary variables that are indexed and
19 studied include equity coverage of debt, equity coverage of
20 intangibles, "quick ratio", accounting methods, variability of return,
21 fixed charge coverage, stock price stability, and company size.

22
23 Price Stability Index

24
25 An index based upon a ranking of the weekly percent changes in the
26 price of the stock over the last five years. The lower the standard
27 deviation of the changes, the more stable the stock. Stocks ranking
28 in the top 5% (lowest standard deviations) carry a Price Stability
29 Index of 100; the next 5%, 95; and so on down to 5. One standard
30 deviation is the range around the average weekly percent change in
31 the price that encompasses about two thirds of all the weekly
32 percent change figures over the last five years. When the range is
33 wide, the standard deviation is high and the stock's Price Stability
34 Index is low.

35
36 Beta

37
38 A measure of the sensitivity of the stock's price to overall
39 fluctuations in the New York Stock Exchange Composite Average.
40 A Beta of 1.50 indicates that a stock tends to rise (or fall) 50%
41 more than the New York Stock Exchange Composite Average. Use

1 Beta to measure the stock market risk inherent in any diversified
2 portfolio of, say, 15 or more companies. Otherwise, use the Safety
3 Rank, which measures total risk inherent in an equity, including that
4 portion attributable to market fluctuations. Beta is derived from a
5 least squares regression analysis between weekly percent changes in
6 the price of a stock and weekly percent changes in the NYSE
7 Average over a period of five years. In the case of shorter price
8 histories, a smaller time period is used, but two years is the
9 minimum. The Betas are periodically adjusted for their long-term
10 tendency to regress toward 1.00.

11
12 Technical Rank

13
14 A prediction of relative price movement, primarily over the next
15 three to six months. It is a function of price action relative to all
16 stocks followed by Value Line. Stocks ranked 1 (Highest) or 2
17 (Above Average) are likely to outpace the market. Those ranked 4
18 (Below Average) or 5 (Lowest) are not expected to outperform most
19 stocks over the next six months. Stocks ranked 3 (Average) will
20 probably advance or decline with the market. Investors should use
21 the Technical and Timeliness Ranks as complements to one another.